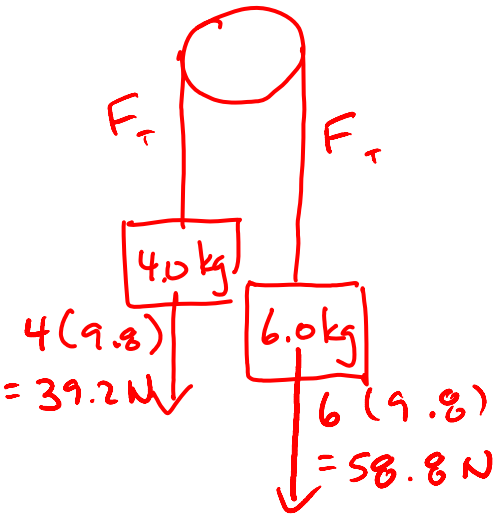
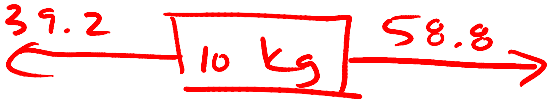
Example #13. Two masses are suspended by a single pulley, and hang on each side of it. One mass is 4.0 kg and the other is 6.0 kg. Find:

a) the acceleration of the system.

b) the tension in the rope.



a) f.b.d. of the whole system:

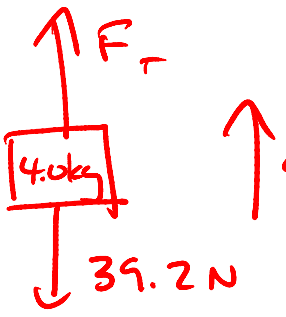


$F_{Net} = 58.8 - 39.2 = 19.6\ N$

$F_{Net} = m_{tot}a$

$19.6 = 10\ a$ $\quad \boxed{a = 2.0\ m/s^2}$ (1.96)

b) f.b.d. of 4.0 kg mass:



$a = 1.96\ m/s^2 \Rightarrow F_{Net} = 4(1.96) = 7.8\ N$

$F_T > 39.2$

so $F_{Net} = F_T - 39.2$

$F_T = 39.2 + 7.8$ $\quad \boxed{F_T = 47\ N}$